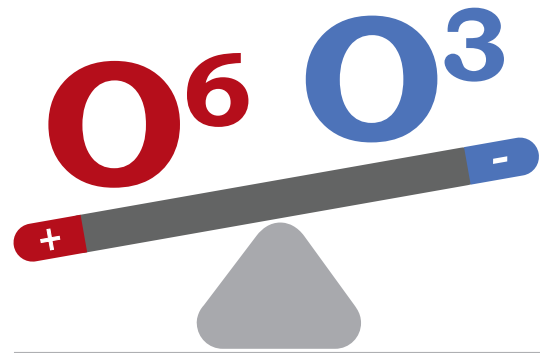


PENN STATE DAIRY CATTLE NUTRITION WORKSHOP

NOVEMBER 12, 2020

*Targeted Omega-3 Fat Feeding:
Effects on Reproduction and Immune Function*

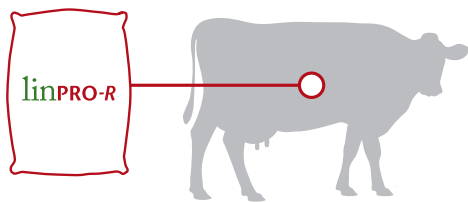
[View the presentation at www.otfarms.com/pennstate](http://www.otfarms.com/pennstate)



Introduction

The transition period encompasses three weeks prior to and three weeks post-calving, and is a stressful time in the cow's life with increased incidence of metabolic and infectious diseases. During this period cows encounter **negative energy balance (NEB)** due to extreme metabolic stress and changing hormones as they transition from a pregnant to energy-demanding lactating state.

This NEB impairs immunity leading to increased incidence of disease (mastitis), reduced fertility, and decrease milk output, causing economic loss to the producer.



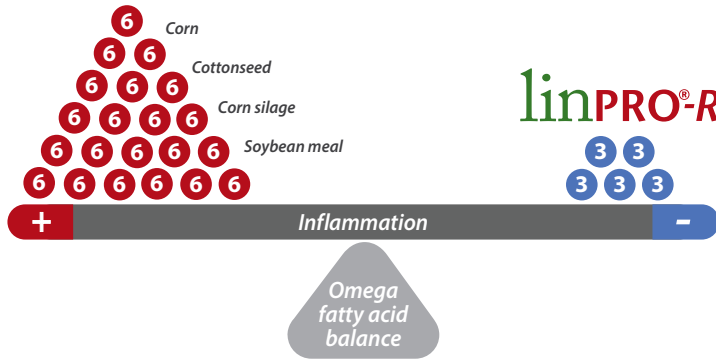
Objective

PennState research studies have targeted Omega-3 fat feeding using Linpro-R, an extruded flaxseed supplement, measuring effects on immune function, plasma metabolites, and fatty acid composition of milk fat, plasma, and red blood cells.



Implications

LinPRO-R, the Omega-3 supplement, altered the activation status of the immune system and reduced inflammatory responses when fed during the transition period. **Cows entered positive energy balance** with improved resolution of inflammation resulting in higher conception and pregnancy rates. Improved milk production, composition and reproductive health were also noted.



Omega-3 fatty acids (FA), which are less abundant in dairy diets, can serve as a **counterbalance** to Omega-6 FA, which are known to amplify inflammation.

The importance of maintaining proper energy balance during the transition period provided multiple benefits, including optimized immune function and productive functions in dairy cattle.

Targeted Fat Feeding during the Transition Period

Conclusion

- ✓ Targeted fat feeding increases energy density in the diet and can **reduce negative energy balance** increasing fertility and milk production
- ✓ Fats differ in composition. Including Omega-3 FA that can affect the physiology of the animal is essential
- ✓ Omega-3 PUFA serve as precursors for bioactive hormones that regulate immune function
- ✓ Omega-6 FA are abundant in dairy diets and can amplify inflammation while Omega-3 FA **counterbalance**, leading to optimal activation and resolution of inflammation

Penn State & O&T Farms Research

- **2015-2016 On campus**
- **2017-2019 On commercial dairy operation**
 - **6 x 60 day periods**
 - **2,000 cows**
- **Presented initial findings at the 2017, 2019 ADSA**

Bottom line: linPRO-R can positively alter immune function, reproduction, and milk production.

Acknowledgements

Dr. Troy Ott, Professor, Department of Animal Science, Penn State, is a reproductive biologist who studies establishment and maintenance in pregnancies and particularly how the immune system is involved in that process. Dr. Ott presents his team's findings from the collaborative work of O&T Farms and Penn State over a series of studies on immunity, conception, and production from 2015 to 2019. [The presentation can be viewed at www.otfarms.com/pennstate](http://www.otfarms.com/pennstate)

The Product

LinPRO-R is a commercial flaxseed-based feed ingredient manufactured using dry-extrusion processing technology incorporating a unique ingredient combination of peas, alfalfa, vitamin E, and flaxseed. It is a ready-to-use, economical and stable source of plant-based Omega-3s and proteins that support immunity, reproduction and milk production.